

3.8 PALEONTOLOGICAL RESOURCES

Paleontological resources are the fossiliferous remains or traces of prehistoric plant and animal life that are not connected with human cultural resources (Deméré and Walsh 2003). Paleontological resources (such as bones, teeth, shells, and wood) are found in geologic deposits within which they were originally buried and can provide a historic record of environmental conditions outside of human influence, depending on the age and characteristics of the formation. These resources represent a limited, nonrenewable, and sensitive scientific and education resource.

A variety of studies have been completed to characterize geologic formations and their potential for containing paleontological resources. This analysis relies on *Paleontological Resources, San Diego County California*, prepared by Thomas Deméré, PhD, and Stephen Walsh (Deméré and Walsh 2003), to identify the potential for resources in the study area as well as personal communication with Dr. Deméré of the San Diego Natural History Museum (Deméré 2012a). Based on past studies and findings throughout the San Diego region, local geologic formations have been assigned paleontological resource sensitivity, indicating their potential to contain paleontological resources of scientific importance. Resources could be disturbed as part of excavation activities, which are proposed for specific areas within and around the lagoon, as illustrated in Figures 2-12 through 2-14. No excavation is proposed as part of materials disposal/reuse. Therefore, this section focuses on the lagoon restoration efforts, including construction access roads and the proposed new bridge and lagoon inlet associated with Alternative 2A. Potential effects to paleontological resources that could be located within the excavation sites within the restoration area are identified, as well as any measures to reduce those impacts.

3.8.1 AFFECTED ENVIRONMENT

Due to the relationship between fossils and geologic formations in which they can occur, the geology of an area provides a reasonable basis for predicting the potential for the presence of paleontological resources. As discussed in Section 3.5 (Geology/Soils), terraces and slopes within the study area are underlain by Delmar and Torrey sandstone formations (Td and Tt), topped by Lindavista red sandstone (Qt1-4). Sediment within the lagoon is generally classified as alluvium and colluvium (Qal).

Paleontological Resources, San Diego County California (Deméré and Walsh 2003) provides generalized potential sensitivity for different geologic deposits within San Diego County. The proposed project is located within the Coastal Plain region of the Peninsular Ranges Province. The Coastal Plain region is underlain by a “layer cake” sequence of marine and nonmarine

sedimentary rock units that record portions of the last 140 million years of earth history. Over this period of time, the relationship of land and sea has fluctuated drastically such that today we have ancient marine rocks preserved up to elevations of around 900 feet above sea level and ancient river deposits as high as 1,200 feet. Faulting related to the local La Nación and Rose Canyon fault zones has broken up this sedimentary sequence into a number of distinct fault blocks in the southwestern part of San Diego County, while in the northern area the effects of faulting are not as great and the rock units are relatively undeformed (Deméré and Walsh 2003). Descriptions of specific formations found within the restoration area are summarized below in Table 3.8-1.

Table 3.8-1
Paleontological Formation Characteristics and Sensitivity

Formation	Characteristics	Sensitivity
Later Quaternary Alluvium	Alluvial sediments of relatively recent age (i.e., generally younger than 10,000 years old). Consists of poorly consolidated clays, silts, sands, and gravels generally laid down by ephemeral streams.	Low
Delmar	Consists of greenish silty mudstones, brown siltstones, and greenish sandstones deposited in a lagoonal/estuarine setting. This formation supports well-preserved to poorly preserved remains of estuarine invertebrates and estuarine vertebrates.	High
Torrey Sandstone	Consists primarily of yellowish-white, coarse-grained, locally cross-bedded, arkosic sandstones deposited in an ancient nearshore marine environment. This formation has produced important remains of fossil plants and marine invertebrates.	Moderate
Lindvista	Represents a marine and/or nonmarine terrace deposit of early Pleistocene age (approximately 0.5–1.5 million years ago). Fossils collected from these sites consist of remains of nearshore marine invertebrates as well as sparse remains of sharks and baleen whales.	Moderate
Unnamed River Terrace Deposits	Deposits of coarse-grained, gravelly sandstones, pebble and cobble conglomerates, and claystones generally occur at levels above the active stream channels and represent the sediments of ancient river courses. These deposits have produced well-preserved remains of aquatic vertebrates and terrestrial mammals.	Moderate to High
Unnamed Marine Terrace Deposits	Deposits consist of a basal nearshore marine unit, producing large and diverse assemblages of marine invertebrate fossils, and an upper nonmarine unit, producing sparse remains of terrestrial mammals.	Moderate to High

Source: Deméré and Walsh 2003

Known Paleontological Resources

A considerable number of paleontological resources have been discovered in the areas immediately surrounding San Elijo Lagoon, particularly along the eastern shores. No paleontological resources have been identified or recovered from within the San Elijo Lagoon basins where restoration activities would be focused.

3.8.2 CEQA THRESHOLDS OF SIGNIFICANCE

A significant impact related to paleontological resources would occur if implementation of the proposed project would:

- A. Directly or indirectly destroy a unique paleontological resource or site; or
- B. Require grading or excavation that would disturb the substratum or parent material below the major soil horizons in any formation with a paleontological sensitivity rating of moderate or high (as assigned per Paleontological Resources, County of San Diego California [Deméré and Walsh 2003]).

These CEQA thresholds were derived from a combination of sources, including Appendix G of the CEQA Guidelines and the County Guidelines for Determining Significance for paleontological resources.

3.8.3 ENVIRONMENTAL CONSEQUENCES

This section discusses the environmental consequences, or impacts, associated with the proposed project on paleontological resources associated with the lagoon and impacted upland areas. Potential adverse, significant, or beneficial direct and indirect impacts are identified as appropriate.

As described above, a direct relationship exists between fossils and the geologic formations in which they are entombed; thus, with information specific to the geology of a particular area and the corresponding paleontological resource potential, it is possible to reasonably assess if fossils might or might not be found during excavation in native substratum material or bedrock formations. Because paleontological resources usually are irregularly dispersed throughout a geologic formation, both horizontally and vertically, the specific location of fossils within a particular formation cannot be predetermined.

Direct impacts to a paleontological resource could result from grading, excavation, trenching, boring, tunneling or other ground-disturbing activity that disrupts subsurface geologic formations and causes the destruction or alteration of a paleontological resource. Indirect impacts to paleontological resources are not specifically caused by development of a project, but rather may be a reasonably foreseeable result of such a project. An example of an indirect impact to paleontological resources could be the destruction or loss of surface fossils from increased erosion during or after completion of a project or the unauthorized tampering or removal of a fossil or paleontological resource from a project site. Actions that place material on top of

existing surface areas, such as building up dikes or placement of material to level a surface, do not have the potential to adversely impact subsurface resources.

Alternative 2A–Proposed Project

The majority of project-related ground-disturbing activities would occur within portions of the lagoon basins that are generally underlain by alluvial deposits. As detailed in Section 3.8.1, later Quaternary alluvial deposits in San Diego County are assigned low paleontological resource sensitivity because of their young age. This indicates a low potential exists for paleontological resources to be present within the project area requiring excavation within the lagoon. Some other formations within the project area have higher paleontological resource sensitivity ratings; however, these formations typically occur on the terraces surrounding the lagoon rather than in the lagoon itself where ground-disturbing basin excavations would occur.

Deeper excavation activities, beyond those to remove dredge material from the basin floor, such as for the new inlet structure, Coast Highway 101 bridge foundations, channel deepening, or the site access roads, would be required as part of the proposed project. A considerable number of known paleontological resources have been identified in areas immediately adjacent to San Elijo Lagoon and this indicates a potential likelihood that additional resources may be located within sensitive underlying formations, such as the Delmar Formation that immediately surrounds a large portion of the lagoon area, with the most sensitive areas located generally to the east (Deméré 2012a). Excavation in the east basin, nearest to the most paleontologically sensitive formations toward the east end of the lagoon, would be limited to channel excavation and would not extend outside of the basin area. Current engineering shows deeper excavation activities, such as bridge footings, would extend only into upper soil layers and are not anticipated to reach underlying bedrock formations where sensitive paleontological resources may exist. Additionally, many of these deeper excavation locations would be in the western portion of the lagoon, near the coastline, where known locations of paleontological resources are not as concentrated. Areas of increased inundation due to flooding necessary for construction activities are not anticipated to experience increased erosion or other effects that could alter or damage the underlying higher sensitivity bedrock of the area and impact paleontological resources contained within those formations.

Generally, proposed staging areas and access roads would be sited at existing access points and previously disturbed areas, minimizing site preparation requirements. The majority of necessary site preparation would include minor grading and clearing to create level surfaces or expand usable area. However, some vegetation clearing, grading, and fill to widen the existing access road to accommodate construction and maintenance vehicles and equipment would be necessary. The proposed access road along the southern boundary of the lagoon, which would provide

access from North Rios Avenue, would be partially located outside of the lagoon basin. The Delmar Formation borders the entire southern boundary of the lagoon and the access road could extend into areas underlain by this highly sensitive paleontological formation. Paleontological resources have not been recovered in this immediate area (Deméré 2012b). Surface grading to improve (flatten or widen) the existing roadway may be required in focused areas, although it would be limited to shallow grading along the ground surface. The highly sensitive Delmar Formation occurs at or near the surface in this area, so excavation of any depth may have the potential to impact paleontological resources. Thus, these shallow grading activities may disturb the underlying sensitive formation, resulting in a potential for paleontological resources to be damaged or destroyed. **Grading within the Delmar Formation could destroy a unique paleontological resource or affect an area of underlying sensitive parent material with moderate to high sensitivity, and impacts are potentially significant under CEQA (Criteria A and B).**

Any grading along the road would remain shallow and limited to small areas, and no known paleontological resources are located in the immediate vicinity of the roadway; therefore, this impact is not considered substantially adverse under NEPA.

Once completed, the proposed project would not result in additional ground disturbance to parent materials or underlying formations. Ongoing maintenance dredging would occur but would be restricted to the alluvial area and to settled materials within the basins, rather than underlying materials.

Alternative 1B

As detailed under Alternative 2A, project-related ground-disturbing activities would occur within the lagoon itself in areas generally underlain by alluvial deposits that are assigned a low paleontological resource sensitivity. Alternative 1B would require excavation work around existing bridge supports for retrofitting activities, but would be engineered to extend only in subsurface soil layers and not into underlying bedrock formations where paleontological resources may be located.

Similar to Alternative 2A, the proposed access road extending from North Rios Avenue would be partially located outside of the lagoon basin and is potentially underlain by the Delmar Formation. Shallow surface grading to improve (flatten or widen) the existing roadway may be required in focused areas and may disturb the underlying sensitive formation, resulting in a potential for paleontological resources to be damaged or destroyed. **Grading within the Delmar Formation could destroy a unique paleontological resource or affect an area of underlying**

sensitive parent material with moderate to high sensitivity, and impacts are potentially significant under CEQA (Criteria A and B).

Any grading along the road would remain shallow and limited to small areas, and no known paleontological resources are located in the immediate vicinity of the roadway; therefore, this impact is not considered substantially adverse under NEPA.

Alternative 1A

As detailed under Alternative 2A and Alternative 1B, project-related ground-disturbing activities would occur within the lagoon itself in areas generally underlain by alluvial deposits that are assigned a low paleontological resource sensitivity. Alternative 1A would require excavation work around existing bridge supports for retrofitting activities, but would be engineered to extend only in subsurface soil layers and not into underlying bedrock formations where paleontological resources may be located.

The proposed access road extending from North Rios Avenue would be partially located outside of the lagoon basin and is potentially underlain by the Delmar Formation. Shallow surface grading to improve (flatten or widen) the existing roadway may be required in focused areas and may disturb the underlying sensitive formation, resulting in a potential for paleontological resources to be damaged or destroyed. **Grading within the Delmar Formation could destroy a unique paleontological resource or affect an area of underlying sensitive parent material with moderate to high sensitivity, and impacts are potentially significant (Criteria A and B) under CEQA.**

Any grading along the road would remain shallow and limited to small areas, and no known paleontological resources are located in the immediate vicinity of the roadway; therefore, this impact is not considered substantially adverse under NEPA.

No Project/No Federal Action Alternative

The No Project/No Federal Action Alternative would not require ground-disturbing activities nor result in the potential for increased erosion that could expose underlying soils or formations. Because no ground disturbance would occur, there would be no disturbance of paleontological resources or work within underlying sensitive parent material with moderate to high sensitivity. **Thus, no significant or substantial adverse direct or indirect impact would result (Criteria A and B).**

3.8.4 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

Grading associated with the access road off North Rios Avenue could occur within the highly sensitive Delmar Formation, and impacts are potentially significant under CEQA (Criteria A and B). Mitigation measures Paleo-1 and Paleo-2 will be required under CEQA for excavation along that roadway that occurs within the Delmar Formation. Additionally, PDF-19 requires that access roads be sited in previously disturbed areas to minimize the extent of ground disturbance. No substantial adverse impacts were identified under NEPA; therefore, these measures are considered NEPA avoidance and/or minimization measures.

Paleo-1: A monitoring program during grading, trenching, or other excavation into undisturbed rock and sediment layers beneath the soil horizons and a fossil recovery program, if significant paleontological resources are encountered, shall be implemented. A County-approved paleontologist shall be contracted to perform paleontological resource monitoring and a fossil recovery program if significant paleontological resources are encountered during grading, trenching, or other excavation into undisturbed rock layers beneath the soil horizons in proximity to the Delmar Formation along the North Rios Avenue access road. The following shall be completed:

- A County-approved paleontologist shall perform the monitoring (and recovery, if necessary, and report preparation) duties pursuant to the most current version of the County of San Diego Guidelines for Determining Significance for Paleontological Resources. The contract provided to the County shall include an agreement that the grading/ trenching/excavation monitoring will be completed. The contract shall include a cost estimate for the monitoring work and reporting.
- The cost of the monitoring shall be bonded.

Paleo-2: A final Paleontological Resource Mitigation Report that documents the results, analysis, and conclusions of all phases of the Paleontological Monitoring Program shall be prepared, if excavation into the Delmar Formation occurs and monitoring is required.

3.8.5 LEVEL OF IMPACT AFTER MITIGATION

CEQA: Impacts to paleontological resources would be reduced to less than significant with implementation of the mitigation measures above.

NEPA: No substantial direct or indirect adverse impacts to paleontological resources were identified.

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